PATENT COOPERATION TREATY

PCT

TRANSLATION INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NEC04P229	FOR FURTHER ACTION	See Form PCT/IPEA/416							
International application No.	International filing date (day/mo	nth/year) Priority date (day/month/year)							
PCT/JP2005/001389	01.02.2005	23.02.2004							
International Patent Classification (IPC) or nati	onal classification and IPC	L							
F04B9/00(2006.01), H	01L23/473(2006.()1)							
10425,00(2000.01), 11011125,475(2000.01)									
Applicant									
NEC CORPORATION									
This report is the international prelin under Article 35 and transmitted to the		shed by this International Preliminary Examining Authority 5.							
2. This REPORT consists of a total of	17 si	neets, including this cover sheet.							
This report is also accompanied by A	NNEXES, comprising:								
a. (sent to the applicant and	to the International Bureau) a tot	al of 7 sheets, as follows:							
		ch have been amended and are the basis for this report and/or							
sheets containing re Instructions).	ctifications authorized by this Aut	hority (see Rule 70.16 and Section 607 of the Administrative							
		Authority considers contain an amendment that goes beyond							
Box.	e international application as filed	, as indicated in item 4 of Box No. I and the Supplemental							
b. (sent to the International	Bureau only) a total of (indicate ty	pe and number of electronic carrier(s))							
related thereto, in computer	readable form only as indicated	, containing a sequence listing and/or tables in the Supplemental Box Relating to Sequence Listing (see							
Section 802 of the Administ		in the Supplemental Box Relating to Sequence Elisting (see							
4. This report contains indications relati	ng to the following items:								
Box No. I Basis of the	report								
Box No. II Priority									
Box No. III Non-establi	shment of opinion with regard to	novelty, inventive step and industrial applicability							
	ty of invention	-							
		regard to novelty, inventive step or industrial applicability;							
BON 110: 1	d explanations supporting such sta								
Box No. VI Certain doc	uments cited								
Box No. VII Certain defe	ects in the international application	1							
Box No. VIII Certain observations on the international application									
Date of submission of the demand	Date of co	mpletion of this report							
Name and mailing address of the IPEA/JP		dofficer							
Facsimile No.	Telephone	No.							

International application No.

PCT/JP2005/001389

Box	k No. I	Basis of the report					
1.		h regard to the language, this report is based on the internatio cated under this item.	nal application in the language in w	hich it was filed, unless otherwise			
	П	This report is based on translations from the original langua	_	,			
		which is the language of a translation furnished for the purposes of:					
		international search (Rule 12.3 and 23.1(b)) publication of the international application (Rule 12.4)				
		international preliminary examination (Rule 55.2 and/					
2.		ith regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the ceiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to					
	thi s	report):					
		the international application as originally filed/furnished					
		the description:					
		pages 1-11		as originally filed/furnished			
		pages*					
		pages*	received by this Authority on _				
	M	the claims:					
		nos.		as originally filed/furnished			
		nos.*					
		nos.* 1-14	received by this Authority on	13.07.2005			
		nos.*	received by this Authority on				
	\boxtimes	the drawings:					
		sheets 1-9		as originally filed/furnished			
		sheets*	received by this Authority on _				
		sheets*	received by this Authority on				
		a sequence listing and/or any related table(s) – see Supplem	ental Box Relating to Sequence Lis	sting.			
3.		The amendments have resulted in the cancellation of:					
		the description, pages					
		the claims, nos.					
		the drawings, sheets/figs					
		the sequence listing (specify):					
		any table(s) related to sequence listing (specify):					
4.		This report has been established as if (some of) the amend they have been considered to go beyond the disclosure as fil					
		the description, pages					
		the claims, nos.					
		the drawings, sheets/figs	the drawings, sheets/figs				
		the sequence listing (specify):					
		any table(s) related to sequence listing (specify):		_			
*	If ite	em 4 applies, some or all of those sheets may be marked "supe	erseded."				

International application No.		
PCT/JP2005/001389		

Statement					
Novelty (N)	Claims	1-14	_ YES		
	Claims				
Inventive step (IS)	Claime	2. 9	YES		
	Claims	1, 3-8, 10-14	NO		
Industrial applicability (IA)					
moustim approximity (112)					
2. Citations and explanations (Rule 70.7)					
Document 1: Mic	crofil	n of the specification and drawings			
an	nexed	to the Japanese Utility Model			
Ap	plicat	ion No. 189816/1987 (Laid-open No.			
93	379/19	89) (Misuzu Eric Co., Ltd.), 20 June			
19	89				
Document 2: JP	4-183	978 A (Seiko Epson Corporation), 30			
Ju	ne 199	2			
Document 3: JP	2003-	120541 A (Matsushita Electric			
In	dustri	al Co., Ltd.), 23 April 2003			
Document 4: JP	2001-3	355574 A (Matsushita Electric			
In	dustri	al Co., Ltd.), 26 December 2001			
Document 5: JP	9-324	764 A (Matsushita Refrigeration Co.),			
16	Decem	ber 1997			
Document 6: JP	2003-2	29879 A (Hitachi, Ltd.), 31 January			
20	03				
Document 7: JP	2002-	163042 A (Toshiba Corporation), 7			
Ju	ne 200	2			
Document 8: JP	2003-	121254 A (Yasuhiko Tawara), 23 April			
20	03				
The invent	tion se	et forth in claim 1 does not involve			
an inventive st	tep in	the light of documents 1 and 2 cited			
in the internat	cional	search report and newly cited			
	Statement Statement Statement Novelty (N)	Statement	Novelty (N) Claims 1-14 Claims 1-14		

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

The inventions set forth in claims 2 and 9 are not disclosed in any of the documents cited in the international search report, and are therefore novel and involve an inventive step. In particular, none of the documents discloses or suggests a controlling means which controls fluctuations in frequency when starting up a sine wave oscillating means using three or more different frequencies.

The invention set forth in claim 3 does not involve an inventive step in the light of documents 1 to 3 cited

in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit is understood to have a sine wave generating means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

The invention set forth in claim 4 does not involve an inventive step in the light of documents 1, 2 and 4

cited in the international search report.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit is understood to have a sine wave generating means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 5 does not involve an inventive step in the light of documents 1, 2 and 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage

generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 6 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an

amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 7 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage

generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 8 does not involve an inventive step in the light of documents 1, 2 and 4

cited in the international search report, and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 10 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave

transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 11 does not involve an inventive step in the light of documents 1, 2 and 4 cited in the international search report.

In the light of document 1 (description, page 6,

lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 12 does not involve an inventive step in the light of documents 1, 2 and 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these

amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 13 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltageboosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 14 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report and newly cited

document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would

International application No.
PCT/JP2005/001389

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

International application No.

PCT/JP2005/001389

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

- (1) The "fig. 6" set forth in paragraph [0042] is understood to be a typographical error for "fig. 5".
- (2) The "fig. 1" set forth in paragraphs [0049] and [0050] is understood to be a typographical error for "fig. 7".